

First Pol-InSAR Forest Height Inversion by means of L-band F-SAR Data

Seung-Kuk Lee²⁾¹⁾, Florian Kugler¹⁾, Konstantinos Papathanassiou¹⁾ & Irena Hajnsek^{2) 1)}

1) Microwaves and Radar Institute (HR), German Aerospace Center (DLR), Germany

2) Institute of Environmental Engineering, ETH Zurich, Switzerland

ABSTRACT

Polarimetric Synthetic Aperture Radar Interferometry (Pol-InSAR) has been developed to a powerful technique for quantitative forest applications, based on the combination of two important SAR measurements: Interferometry and Polarimetry. The coherent combination of polarimetric and interferometric information provides the separation and the identification of different scattering contributions within the resolution cell. In last decade, a variety of quantitative models for the estimation of forest parameters from Pol-InSAR data, as the Random Volume over Ground (RVoG) model, have been developed and demonstrated mostly using airborne SAR systems.

The F-SAR sensor is the next generation of the well-known DLR's E-SAR system and provides higher resolution, fully polarimetric and interferometric SAR data in multi-frequencies (X-, C-, S-, L- and P-band). Currently, the repeat-pass L-band F-SAR system was completed. The fully polarimetric and interferometric SAR data were acquired over the Traunstein in the southeast of Germany in 2011. The Traunstein has been the test site for previous E-SAR campaigns: TreeSAR 2003 and TempoSAR 2008 and 2009. In this sense, F-SAR system allows the successive forest monitoring, application, validation and development of the Pol-InSAR techniques.

In this paper, first the actual status of multi-baseline Pol-InSAR techniques is reviewed and then the potential of the new F-SAR system for Pol-InSAR forest applications is discussed. This study is supported and validated by using fully polarimetric and interferometric data sets acquired by repeat-pass L-band E-SAR and F-SAR systems.